

## 7.8 Present Value of an Ordinary Annuity

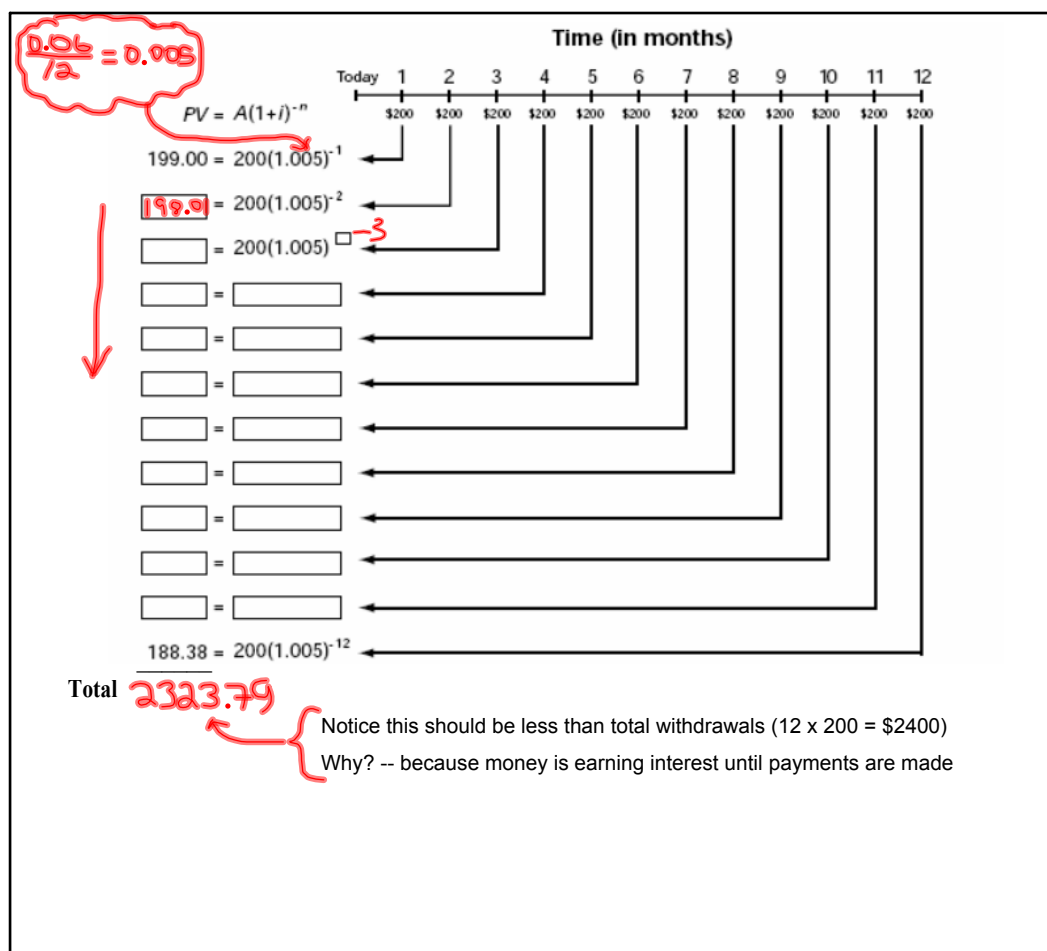
Owen and Anna are approaching retirement and are putting their finances in order. They have worked hard and invested their earnings so that they now have a large amount of money on which to live. They hire a financial advisor, and together they consider whether Owen and Anna have enough money to allow them to live comfortably for the rest of their lives by making regular withdrawals from an account. To do this, they calculate the present value of an annuity based on Owen and Anna's projected living expenses.

How much do you need to invest NOW to make regular withdrawals or finance NOW that must be paid back by deposits.

Solve a PV Annuity Problem:

Method 1: Use a time line diagram

Holly must begin to repay her student loan. Her monthly payments of \$200 will be withdrawn at the end of each month from an account earning 6% interest compounded monthly. How much must she deposit in the account today so that loan payments can be made for one year?



**Method 2: Use a Formula**

Holly must begin to repay her student loan. Her monthly payments of \$200 will be withdrawn at the end of each month from an account earning 6% interest compounded monthly. How much must she deposit in the account today so that loan payments can be made for one year?

$$PV = \frac{R[1 - (1 + i)^{-n}]}{i}$$

where PV is the present value in \$  
 R is the regular payment  
 i is interest rate per period  
 n is total the number of deposits

$$= \frac{200 \left[ 1 - \left( 1 + \frac{0.06}{12} \right)^{-12} \right]}{\frac{0.06}{12}} \div (0.06 \div 12)$$

1st  
2nd

$$= 2323.79$$

∴ She should deposit \$2323.79 now.

**Method 3: Use a Graphing Calculator**

Holly must begin to repay her student loan. Her monthly payments of \$200 will be withdrawn at the end of each month from an account earning 6% interest compounded monthly. How much must she deposit in the account today so that loan payments can be made for one year?

Step 1: Press **MODE** and set the number of decimal places to 2:



Step 2: Press **APPS** 1 1 to open the TVM Solver:



Step 3: Enter the values of the variables as shown.

What the variables represent:

N (Number of Payments)

I% (Annual Interest Rate)

PV (Present Value)

PMT (Payment)

PMT is negative because money is

P/Y (Number of Payments/Year)

C/Y (Number of Compounding Periods/Year)

PMT: END BEGIN (Payments at End of Payment Interval)

PV = 0.00 because it is the variable to be solved

being paid out

FV = 0.00 because there will be no money in the account when the payments are finished

N = 12 1x12  
 I% = 6  
 PV = ?  
 PMT = -200  
 FV = 0  
 P/Y = 12  
 C/Y = 12  
 PMT: END BEGIN

graphing  
Cal

HMWK:

p 506

# 2, 3b, 5 - 8, 11, 12, 18, 16\*

